

4.18 ESSENTIAL FISH HABITAT ASSESSMENT - IMPACTS

This section, together with Section 4.4, evaluates the environmental consequences as a result of the impacts of the Proposed Action and its alternatives on EFH and associated NMFS trust resources. Trust resources include the managed species, aquatic resources of national importance (ARNI), and other species of importance addressed in Section 3.17. These aquatic resources, described in detail in Sections 3.4 and 3.17, comprise the living marine resources that use or potentially use the shallow water habitats of EFH at the Broadwater and Back Bay sites.

4.18.1 Direct Impacts

The Proposed Action and its alternatives would affect unvegetated shallow water soft bottom habitat (see Table 4.4-4) identified as EFH. Impacts to this bottom habitat and associated aquatic resources are also addressed in Section 4.4. The discussion below concentrates primarily on effects to commercially important species (i.e., managed species) and associated EFH components.

Alternatives 2, 3, 4, and 5

The primary EFH functions that could be affected by the Proposed Action and Alternatives 3, 4, and 5 include nursery, foraging, and migration. An additional habitat function of importance to the gulf stone crab is that of growth to maturity. Studies of this species have found that development can occur completely within the local waters of the Mississippi Sound (Perry, 1992; MDMR, 1998). The Mississippi Sound and Back Bay provide these habitats to commercially important species. The life histories and habitat requirements of commercially important species within the study area are described in Section 3.17. All of the managed species and ARNI discussed in Section 3.17 would be affected to some degree by the impacts associated with EFH as result of the Proposed Alternative and its alternatives. The primary impact would be to juvenile stages of gray snapper, red snapper, spanish mackerel, gulf menhaden, spotted seatrout, Atlantic croaker, striped mullet, southern flounder, spiny lobster, and stone crab, the larval and/or postlarval forms (including subadults) of red drum, all three shrimp species, spiny lobster, Atlantic croaker, and all life stages of the blue crab. Impacts to these species are considered primary due to the likelihood of their occurrence and/or the use of habitats within the study area. All life stages of the gulf stone crab could be affected slightly by EFH impacts within the study area. Gulf stone crab, documented throughout the Mississippi Sound, has exhibited higher relative abundances outside the study area in the vicinity of the barrier island passes.

The most substantial impact to EFH would be the permanent conversion of aquatic habitat to non-aquatic habitat (see Section 4.4) and the associated loss of productivity and foraging area. The shallow estuarine habitats that would be lost at the Broadwater site are probably most valuable as foraging habitat for juvenile and adult life stages of commercially important species. The Broadwater site probably provides some nursery function. In contrast, the Alternative 3 sites located in the Back Bay are more important as nursery habitat for early life stages of certain species such as shrimp and crabs (see Section 3.4). Consequently, Alternative 3 would have a somewhat greater overall impact on the nursery functions of EFH than Alternatives 2, 4, and 5.

Alternative 3 would also have a potentially greater impact on the migratory aspect of EFH for anadromous and catadromous species. Species such as gulf sturgeon and American eels, documented in the area (GCRI, 1987-1997) use the area for feeding (Alternative 3 Sites A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z).

Cumulative impacts of the Proposed Action or its alternatives on circulation and water quality in the Mississippi Sound are not anticipated to have a significant effect on EFH components. Water quality is not anticipated to decline measurably, for reasons described in Sections 3.3 and 4.3, so no significant cumulative impacts on habitat are expected as a result of changes in water quality. No global changes in circulation were found to occur in the Mississippi Sound, and unless other large projects are built along the Biloxi coastline, changes in the larval drift patterns, migration routes, or other large-scale patterns affecting fish and aquatic invertebrate populations are not expected.

Between 1981 and 1996, the NMFS received and reviewed 1,653 proposals that could potentially affect EFH in Mississippi (GMFMC, 1998). Over time, cumulative impacts on EFH would occur. Mitigation measures required under the Magnuson-Stevens Fishery Conservation and Management Act would help minimize cumulative impacts.

4.18.4 Fishery Management Council (FMC) Views Regarding Project Effects on EFH

The Generic Amendment for Addressing Essential Fish Habitat Requirements in Fishery Management Plans of the Gulf of Mexico (GMFMC, 1998) identifies the FMC's views regarding project effects on EFH. EFH amendments identify potential threats associated with the construction and maintenance of navigation channels (including disposal of dredged materials) and the construction and operation of marinas, in addition to other project types. Specific EFH effects identified by the Generic Amendment, such as habitat modification, release of contaminants, direct removal of organisms, changes in nature and type of sediment, and change in circulation patterns, have been addressed in Sections 4.4 and 4.18. Shading of unvegetated aquatic bottom was also identified as a concern in the interagency PDEIS review meeting on 2 March 2000 in Biloxi, MS. In addition to the potential for direct and indirect impacts, the Generic Amendment indicates that adverse secondary impacts associated with development of the casino industry are significant as a result of secondary development impacts on estuarine resources. However, the FMC also states that quantitative relationships between fishery production and habitat are very complex and no reliable models currently exist to predict or assess these impacts (GMFMC, 1998).

4.18.5 Proposed Mitigation

Mitigation measures are proposed to offset the unavoidable impacts to the EFH components for Alternative 2. These are addressed in Chapter 5.0, Mitigation Plan. Mitigation plan components include restoration of shallow water habitat within the existing Broadwater marina, creation of shallow water and tidal marsh habitats, breakwater enhancements, SAV restoration, establishment of a mitigation fund for SAV research, and acquisition and preservation of Deer Island. These measures are proposed as compensation for unavoidable impacts to unvegetated estuarine bottom, open waters, and wetlands within the Mississippi Sound. Section 5.2 addresses the effectiveness of proposed mitigation measures. General conservation guidelines developed by NMFS for the protection of EFH are provided in the following table.

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4.18.1 Direct Impacts

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Alternatives 2, 3, 4, and 5

The primary EFH functions that could be affected by the Proposed Action and Alternatives 3, 4, and 5 include nursery, foraging, and migration. An additional habitat function of importance to the gulf stone crab is that of growth to maturity. Studies of this species have found that development can occur completely within the local waters of the Mississippi Sound (Perry, 1992; MDMR, 1998). The Mississippi Sound and Back Bay provide these habitats to commercially important species. The life histories and habitat requirements of commercially important species within the study area are described in Section 3.17. All of the managed species and ARNI discussed in Section 3.17 would be affected to some degree by the impacts associated with EFH as result of the Proposed Alternative and its alternatives. The primary impact would be to juvenile stages of gray snapper, red snapper, spanish mackerel, gulf menhaden, spotted seatrout, Atlantic croaker, striped mullet, southern flounder, spiny lobster, and stone crab, the larval and/or postlarval forms (including subadults) of red drum, all three shrimp species, spiny lobster, Atlantic croaker, and all life stages of the blue crab. Impacts to these species are considered primary due to the likelihood of their occurrence and/or the use of habitats within the study area. All life stages of the gulf stone crab could be affected slightly by EFH impacts within the study area. Gulf stone crab, documented throughout the Mississippi Sound, has exhibited higher relative abundances outside the study area in the vicinity of the barrier island passes.

The most substantial impact to EFH would be the permanent conversion of aquatic habitat to non-aquatic habitat (see Section 4.4) and the associated loss of productivity and foraging area. The shallow estuarine habitats that would be lost at the Broadwater site are probably most valuable as foraging habitat for juvenile and adult life stages of commercially important species. The Broadwater site probably provides some nursery function. In contrast, the Alternative 3 sites located in the Back Bay are more important as nursery habitat for early life stages of certain species such as shrimp and crabs (see Section 3.4). Consequently, Alternative 3 would have a somewhat greater overall impact on the nursery functions of EFH than Alternatives 2, 4, and 5.

1 Alternative 3 would also have a potentially greater impact on the migratory aspect of EFH for
2 anadromous and catadromous species. Species such as gulf sturgeon and American eels,
3 documented in the area (GCRL, 1987-1997), use the area for feeding (Alternative 3, Sites A, B,
4 and C) and/or migration between the Mississippi Sound and Back Bay. Because of potential
5 impacts on the migratory aspects of EFH in the Back Bay and nursery habitat, Alternative 3
6 would have a greater impact on EFH than the other alternatives.

7
8 Most of the other changes in habitat and water quality that would occur as a result of the
9 Proposed Action or its alternatives would be short-term (see Section 4.4) and would not result in
10 a long-term substantial loss of function of EFH habitat and related species. This is true of the
11 short-term effects of dredging and construction on populations of benthic organisms that serve as
12 forage for EFH species. Dredging impacts are summarized in Table 4.4-2. Although dredging
13 would have a direct impact on substantial areas of unconsolidated bottom habitat, the associated
14 loss of foraging habitat would be temporary once dredging and fill activities were completed and
15 species were able to recolonize and use the area. Areas not reclaimable as EFH habitat would be
16 addressed through mitigation measures (see Chapter 5.0).

17
18 The proposed depth range for the navigation channels, turning basins, and marina is 10 to 12 feet.
19 According to recent literature (Reilly et al., 1999), these areas would still be defined as a shallow
20 water habitat (within 4 meters below MLW including the intertidal zone) and function at various
21 levels as a productive unvegetated shallow water habitat. After being dredged, these areas would
22 continue to be productive shallow water habitats and benthic organisms would recolonize the
23 dredged channel and continue to provide forage for managed species. Deeper waters do provide
24 a greater potential for stratification, and require higher current and wave energies to mix the
25 water column (USACE, 1996). Hypoxic or near hypoxic conditions may occur at times during
26 the warmer times of the year (see Section 4.3), potentially resulting in a somewhat less diverse
27 and productive habitat than the existing habitat. Hypoxic conditions can shift benthic community
28 composition and function; however, estuarine benthic communities have evolved adaptive
29 mechanisms to recover and survive disturbances to their environmental conditions (Flemer et al.,
30 1999). Section 4.4 and Appendix B provide more complete discussions of depth change impacts
31 as a result of the Proposed Action or its alternatives.

32
33 Maintenance dredging would occur periodically under all alternatives including the No-action
34 Alternative (see Section 4.3 and Appendix D). Limited amounts of material would be dredged
35 on an infrequent basis (about every 10 years) and the material would be disposed in a land-based
36 disposal site. This would minimize the frequency and duration of temporary water quality
37 impacts. The infrequent dredging would also limit the disturbance to the benthic component,
38 allowing the unvegetated shallow water bottom to stabilize and function effectively between
39 dredge maintenance episodes. Impacts on managed species would also be temporary, with
40 species potentially avoiding the dredged channel and immediately adjacent waters at the time of
41 dredging and during the benthic community recovery period.

42
43 Habitat modifications and replacement of habitat types described above (e.g., from estuarine
44 bottom to deeper estuarine bottom, shallow rocky estuarine habitat, or sandy intertidal habitat)
45 would have some impact on EFH and related species (see Chapter 5.0). However, as discussed

1 in Section 5.2, mitigation measures (i.e., breakwater features proposed in Section 5.1) can
2 provide an enhancement for fish production and diversity. Habitat changes would benefit some
3 food organisms and fish species while detracting from the habitat of others. Overall, there may
4 be some net loss in productivity due to shading.

5
6 Based on the assessment of relative EFH values, Alternative 3 would have a greater effect on
7 EFH than Alternatives 2, 4, and 5. Although there would be a permanent loss of unvegetated
8 aquatic bottom of the Mississippi Sound or Back Bay under Alternatives 2, 3, 4, and 5, most
9 impacts to EFH and commercial fisheries would be temporary and short-term in nature. The
10 Proposed Action and its alternatives would not be expected to have a permanent, measurable
11 impact to the overall fishery resources of the Back Bay and Mississippi Sound. It is expected
12 that the impact of the Proposed Action or its alternatives on EFH and commercial fisheries would
13 be negligible and indistinguishable from natural population variations.

14 15 No-Action Alternative

16
17 The No-action Alternative presumes that limited new development would continue to occur at
18 the Broadwater site and the Alternative 3 sites, but the nature of those changes cannot be
19 accurately described. However, periodic maintenance dredging would continue at the
20 Broadwater site (see Section 4.3 and Appendix D). The impacts on EFH would be dependent
21 upon the nature and magnitude of future development, which cannot be accurately estimated.
22 However, due to the limited dredging and aquatic habitat impacts anticipated under the No-action
23 Alternative, the impacts to EFH would likely be minor.

24
25 Existing conditions at the Broadwater Marina would continue, as would any associated impact on
26 EFH. The habitat enhancements and protection of aquatic habitats associated with the purchase
27 and protection of Deer Island described in Chapter 5.0, and any positive impacts on EFH, would
28 not occur.

29 30 **4.18.2 Indirect Impacts**

31
32 Indirect effects or impacts are those that are reasonably foreseeable and are caused by the action,
33 but occur later in time or are typically farther removed in distance. The Proposed Action and its
34 alternatives have the potential to indirectly affect aquatic resources related to EFH in several
35 ways. These changes may include long-term changes in water quality resulting from changes in
36 stormwater and pollutant loading (see Section 4.3), as well as changes in circulation patterns (see
37 Section 4.1) at the Broadwater or Alternative 3 sites. Within the broader ROI, indirect impacts
38 on aquatic resources may result from coastal development, wetland conversion and functional
39 loss, and changes in flows and water quality in coastal watersheds and estuaries.

40 41 Alternatives 2, 3, 4, and 5

42
43 As discussed previously in Section 4.4, water quality changes would occur as a result of the
44 Proposed Action or its alternatives. Based on the findings of Section 4.3, water quality along the
45 coastline of the Mississippi Sound could be affected in two ways. Localized changes in

1 magnitude and direction of tidal and wave-driven current patterns and the greater pollutant runoff
2 from non-point sources associated with new landside developments could lead to localized
3 increases in the levels of pollutants near the shoreline. Water quality locally in the Treasure Bay-
4 Broadwater bay in particular could be periodically degraded because of the combination of
5 increased stormwater pollutant loading and decreased circulation. The attainment of water
6 quality standards is expected to remain similar to the existing condition, and substantial
7 degradation of water quality conditions is not anticipated (see Section 4.3). Section 4.3 identifies
8 measures to minimize and mitigate these impacts.

10 Long-term changes in water quality due to stormwater runoff after the project is in place could
11 affect aquatic biota in the area (see Section 4.4). Development would result in increased
12 impervious surface, runoff volume, and additional runoff pollutants (see Section 4.3). However,
13 development standards in place at the time of the project would require more stringent control of
14 runoff than is required under the existing condition. The Proposed Action and the alternatives
15 would be required to meet or exceed state criteria (see Section 4.3). Section 4.3 identifies
16 measures to minimize and mitigate these impacts. Indirect impacts due to post-development
17 stormwater runoff would have a limited effect on aquatic biota.

19 Minor reductions in wave climate and local circulation and changes to beach shape would occur
20 around Broadwater and its immediately adjacent beaches under Alternatives 2 and 4 because the
21 peninsula would be extended and broadened. These changes—characterized in Section 4.1 as
22 wave shadow effects, circulation eddy reversals, and local changes in sediment accrual—would
23 occur locally around the Broadwater site. Further away from the Broadwater site (approximately
24 1,000 to 3,000 feet), the shoreline and coastal conditions would be unaffected. Reductions in
25 circulation could result in the accumulation of debris and sediment, but from the perspective of
26 physical habitat would have minor impacts on aquatic biota and EFH. The changes would be
27 greatest for Alternatives 2 and 4 because of their longer peninsulas. Alternatives 5 and 3 would
28 produce Biloxi coastal conditions similar to those that occur now.

30 Changes in circulation could potentially affect the transport of larval and early life stages of
31 commercially important species in the immediate vicinity of the project and possibly result in
32 local changes in distribution. The changes in circulation would not affect the general circulation
33 of the Biloxi shoreline or Mississippi Sound (see Section 4.1) and, accordingly, would not affect
34 larval transport in the Sound. Therefore, the effects would be local and minor.

36 Water quality conditions within marinas are generally poor due to associated activities (Chmura
37 and Ross, 1978; Fisher et al., 1987). Water quality conditions within the existing Broadwater
38 Marina would be improved by the development of Alternative 2, because the existing marina
39 would be converted to wetland and open tidal habitat with improved circulation and tidal marsh.
40 Poor habitat conditions in the marina basin, now occurring at the Broadwater site due to low
41 levels of dissolved oxygen and poor circulation, would be eliminated, and biota populations
42 would likely increase. Under Alternative 3, the poor circulation and low levels of dissolved
43 oxygen now existing at the Broadwater Marina may continue.

1 Dissolved oxygen levels would be maintained in the new marina basin for Alternative 2 by
2 circulation/aeration devices (see Section 4.3). Evaluation of model results indicates that aeration
3 and circulation devices under consideration would establish DO levels equal to or greater than 5
4 mg/l within the basin throughout the year. Alternatives 3, 4, and 5 would also be required to
5 meet the 5mg/l standard; however, this would likely require the assistance of aerators to meet
6 EPA standards for dissolved oxygen levels. From a water quality perspective, the marinas of
7 Alternatives 2, 3, 4, and 5 would likely be suitable fish habitat. Chapter 5.0 further addresses the
8 habitat value of the marina and breakwater.

9 10 No-Action Alternative

11
12 The No-action Alternative presumes that limited development would continue to occur at the
13 Broadwater site and the Alternative 3 sites, but the nature of those changes cannot be accurately
14 described. There would be no substantial extension or broadening of the peninsula, and no
15 changes to circulation patterns near the Broadwater site would occur.

16
17 The long-term prognoses for changes in water quality near the Broadwater site are described in
18 Sections 3.3 and 4.3. Under the No-action Alternative, minor increases in stormwater runoff and
19 pollutant loading may be expected, but these impacts cannot be quantified. Poor habitat
20 conditions now occurring at the Broadwater site due to low levels of dissolved oxygen and poor
21 circulation in the marina basin would continue. Impacts due to dredging activity, described
22 previously, may occur under the No-action Alternative during maintenance dredging or casino
23 expansion, but the impacts would be much less than under Alternatives 2, 3, 4, or 5.

24
25 Within the broader ROI, indirect impacts on aquatic resources may result from coastal
26 development, wetland conversion and functional loss, and changes in flows and water quality in
27 coastal watersheds and estuaries associated with regional growth.

28 29 *4.18.3 Cumulative Effects*

30
31 The Proposed Action or its alternatives would result in the direct loss of between 23 acres and 66
32 acres of estuarine bottom habitat classified by NMFS as EFH for a number of recreationally and
33 commercially important species. In Section 4.18, it was concluded that the Proposed Alternative
34 or its alternatives would have some impact on EFH and associated species. However, the
35 majority of impacts to EFH would be short-term versus permanent and would be likely to
36 produce effects indistinguishable from natural population variations. The impacts of the
37 Proposed Action or its alternatives would not contribute significantly to permanent impacts on
38 EFH.

39
40 There are considerable areas of designated EFH available in the immediate vicinity of the
41 Broadwater and Back Bay sites. This adjacent area of EFH would provide similar habitat for
42 species of importance to move into when displacement (temporary or permanent) occurs, as long
43 as adjacent areas have not reached carrying capacity limits.

1 Cumulative impacts of the Proposed Action or its alternatives on circulation and water quality in
2 the Mississippi Sound are not anticipated to have a significant effect on EFH components. Water
3 quality is not anticipated to decline measurably, for reasons described in Sections 3.3 and 4.3, so
4 no significant cumulative impacts on habitat are expected as a result of changes in water quality.
5 No global changes in circulation were found to occur in the Mississippi Sound, and unless other
6 large projects are built along the Biloxi coastline, changes in the larval drift patterns, migration
7 routes, or other large-scale patterns affecting fish and aquatic invertebrate populations are not
8 expected.

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10 Between 1981 and 1996, the NMFS received and reviewed 1,653 proposals that could potentially
11 affect EFH in Mississippi (GMFMC, 1998). Over time, cumulative impacts on EFH would
12 occur. Mitigation measures required under the Magnuson-Stevens Fishery Conservation and
13 Management Act would help minimize cumulative impacts.

14 15 ***4.18.4 Fishery Management Council (FMC) Views Regarding Project Effects on EFH***

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17 The Generic Amendment for Addressing Essential Fish Habitat Requirements in Fishery
18 Management Plans of the Gulf of Mexico (GMFMC, 1998) identifies the FMC's views regarding
19 project effects on EFH. EFH amendments identify potential threats associated with the
20 construction and maintenance of navigation channels (including disposal of dredged materials)
21 and the construction and operation of marinas, in addition to other project types. Specific EFH
22 effects identified by the Generic Amendment, such as habitat modification, release of
23 contaminants, direct removal of organisms, changes in nature and type of sediment, and change
24 in circulation patterns, have been addressed in Sections 4.4 and 4.18. Shading of unvegetated
25 aquatic bottom was also identified as a concern in the interagency PDEIS review meeting on 2
26 March 2000 in Biloxi, MS. In addition to the potential for direct and indirect impacts, the
27 Generic Amendment indicates that adverse secondary impacts associated with development of
28 the casino industry are significant as a result of secondary development impacts on estuarine
29 resources. However, the FMC also states that quantitative relationships between fishery
30 production and habitat are very complex and no reliable models currently exist to predict or
31 assess these impacts (GMFMC, 1998).

32 33 ***4.18.5 Proposed Mitigation***

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35 Mitigation measures are proposed to offset the unavoidable impacts to the EFH components for
36 Alternative 2. These are addressed in Chapter 5.0, Mitigation Plan. Mitigation plan components
37 include restoration of shallow water habitat within the existing Broadwater marina, creation of
38 shallow water and tidal marsh habitats, breakwater enhancements, SAV restoration,
39 establishment of a mitigation fund for SAV research, and acquisition and preservation of Deer
40 Island. These measures are proposed as compensation for unavoidable impacts to unvegetated
41 estuarine bottom, open waters, and wetlands within the Mississippi Sound. Section 5.2 addresses
42 the effectiveness of proposed mitigation measures. General conservation guidelines developed
43 by NMFS as a means to minimize or mitigate EFH impacts applicable to this proposed project
44 are summarized in Section 5.3.